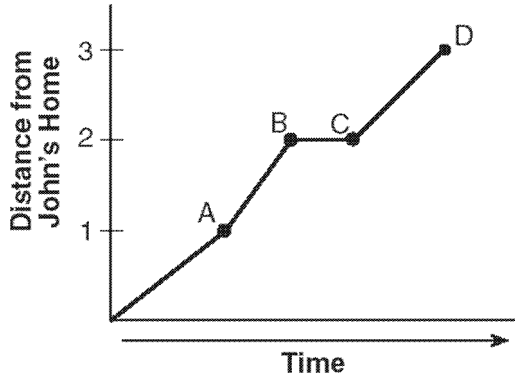


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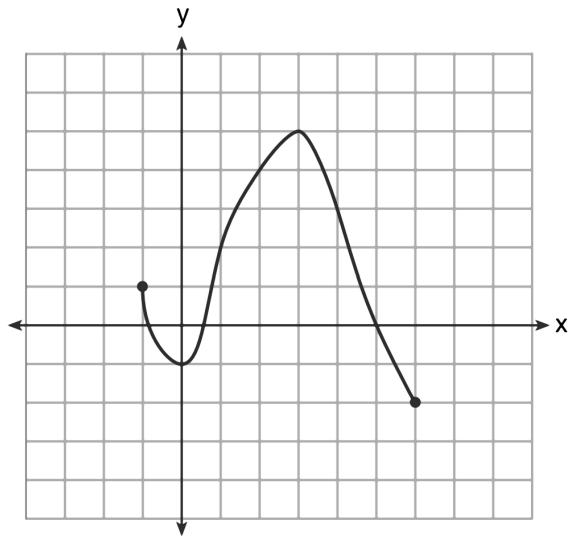
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1. John left his home and walked 3 blocks to his school, as shown in the accompanying graph.



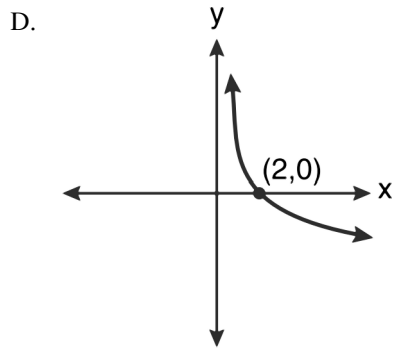
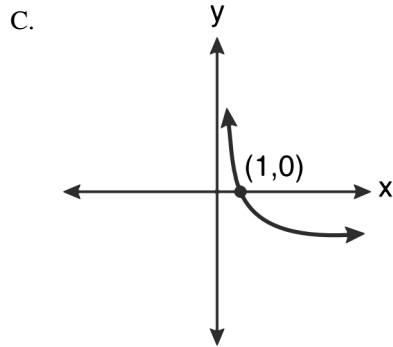
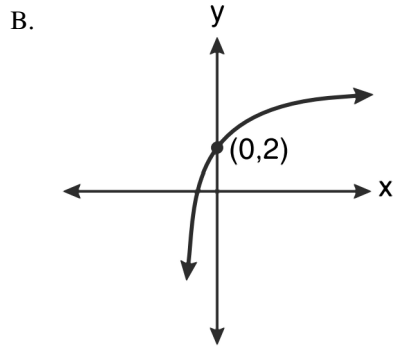
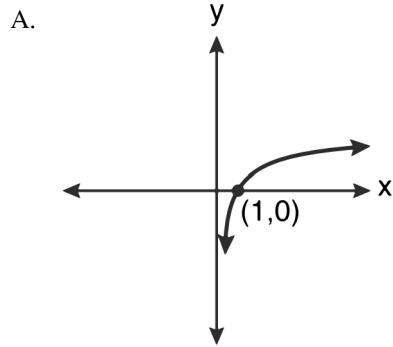
What is one possible interpretation of the section of the graph from point B to point C?

- A. John arrived at school and stayed throughout the day.
 - B. John waited before crossing a busy street.
 - C. John returned home to get his mathematics homework.
 - D. John reached the top of a hill and began walking on level ground.
2. What is the domain of the function shown below?



- A. $-1 \leq x \leq 6$
- B. $-1 \leq y \leq 6$
- C. $-2 \leq x \leq 5$
- D. $-2 \leq y \leq 5$

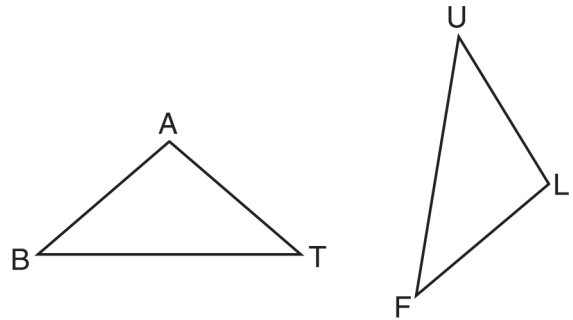
3. Which graph represents the function $\log_2 x = y$?



4. The expression $\frac{\tan \theta}{\sec \theta}$ is equivalent to
- A. $\frac{\cos^2 \theta}{\sin \theta}$ B. $\frac{\sin \theta}{\cos^2 \theta}$
 C. $\cos \theta$ D. $\sin \theta$
5. The roots of the equation $2x^2 - 8x - 4 = 0$ are
- A. imaginary
 B. real, rational, and equal
 C. real, irrational, and unequal
 D. real, rational, and unequal
6. What is the equation of a circle with center $(-3, 1)$ and radius 7?
- A. $(x - 3)^2 + (y + 1)^2 = 7$
 B. $(x - 3)^2 + (y + 1)^2 = 49$
 C. $(x + 3)^2 + (y - 1)^2 = 7$
 D. $(x + 3)^2 + (y - 1)^2 = 49$
7. The expression $\frac{i^{16}}{i^3}$ is equivalent to
- A. 1 B. -1 C. i D. $-i$
8. What are the coordinates of the turning point of the parabola whose equation is $y = -x^2 + 4x + 1$?
- A. $(-2, -11)$ B. $(-2, -3)$
 C. $(2, 5)$ D. $(2, 13)$
9. On a graph, if point A represents $2 - 3i$ and point B represents $-2 - 5i$, which quadrant contains $3A - 2B$?
- A. I B. II C. III D. IV

10. In the accompanying diagram of triangles BAT and FLU , $\angle B \cong \angle F$ and $\overline{BA} \cong \overline{FL}$.

Which statement is needed to prove $\triangle BAT \cong \triangle FLU$?



- A. $\angle A \cong \angle L$ B. $\overline{AT} \cong \overline{LU}$
 C. $\angle A \cong \angle U$ D. $\overline{BA} \parallel \overline{FL}$
11. Which type of transformation is $(x, y) \rightarrow (x + 2, y - 2)$?
- A. dilation B. reflection
 C. rotation D. translation
12. Which functions are positive for angles terminating in Quadrant II?
- A. sine and cosine B. sine and secant
 C. sine and tangent D. sine and cosecant
13. If the equation of the axis of symmetry of a parabola is $x = 2$, at which pair of points could the parabola intersect the x-axis?
- A. $(3, 0)$ and $(5, 0)$ B. $(3, 0)$ and $(2, 0)$
 C. $(3, 0)$ and $(1, 0)$ D. $(-3, 0)$ and $(-1, 0)$
14. What is the length of the altitude of an equilateral triangle whose side has a length of 8?
- A. 32 B. $4\sqrt{2}$ C. $4\sqrt{3}$ D. 4

15. What is the inverse of the function $y = 2x - 3$?

- A. $\frac{x+3}{2}$ B. $\frac{x}{2} + 3$
 C. $-2x + 3$ D. $\frac{1}{2x-3}$

16. If $a > 0$, which function represents the reflection of $y = a^x$ in the y -axis?

- A. $y = -a^x$ B. $y = \left(\frac{1}{a}\right)^x$
 C. $y = \left(\frac{1}{a}\right)^{-x}$ D. $x = a^y$

17. The probability that Laura wins a tennis match against Jennifer is $\frac{2}{3}$. What is the probability that Laura wins *exactly* three of the next four matches she plays against Jennifer?

- A. $\frac{32}{81}$ B. $\frac{8}{81}$ C. $\frac{108}{256}$ D. $\frac{27}{256}$

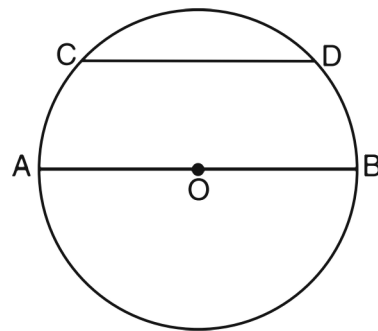
18. The heights of the girls in the eleventh grade are normally distributed with a mean of 66 inches and a standard deviation of 2.5 inches. In which interval do approximately 95% of the heights fall?

- A. 61–66 inches B. 61–71 inches
 C. 63.5–68.5 inches D. 66–71 inches

19. What is the sum of the roots of the equation $2x^2 - 13x + 17 = 0$?

- A. $-\frac{13}{2}$ B. $\frac{13}{2}$ C. $-\frac{17}{2}$ D. $\frac{17}{2}$

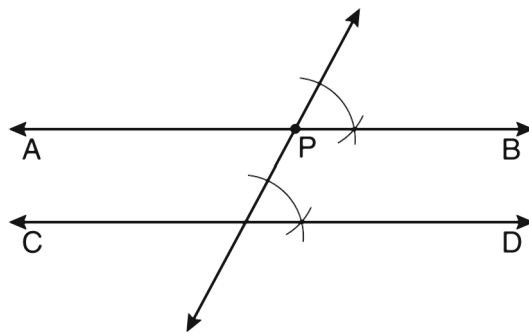
20. In the diagram of circle O , diameter \overline{AB} is parallel to chord \overline{CD} .



If $m\widehat{CD} = 70$, what is $m\widehat{AC}$?

- A. 110 B. 70 C. 55 D. 35

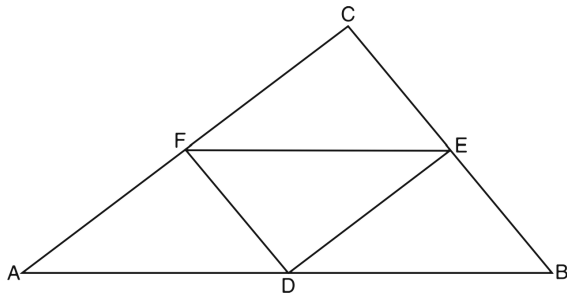
21. The diagram below shows the construction of \overline{AB} through point P parallel to \overline{CD} .



Which theorem justifies this method of construction?

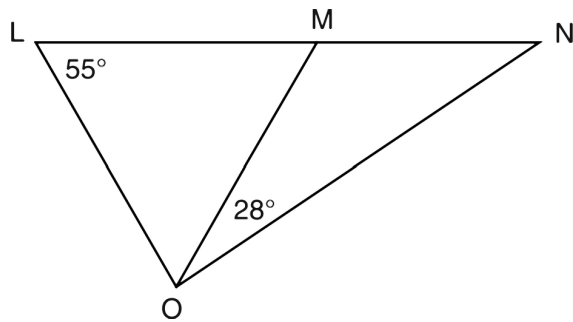
- A. If two lines in a plane are perpendicular to a transversal at different points, then the lines are parallel.
 B. If two lines in a plane are cut by a transversal to form congruent corresponding angles, then the lines are parallel.
 C. If two lines in a plane are cut by a transversal to form congruent alternate interior angles, then the lines are parallel.
 D. If two lines in a plane are cut by a transversal to form congruent alternate exterior angles, then the lines are parallel.

22. In the diagram of $\triangle ABC$ shown below, D is the midpoint of \overline{AB} , E is the midpoint of \overline{BC} , and F is the midpoint of \overline{AC} .



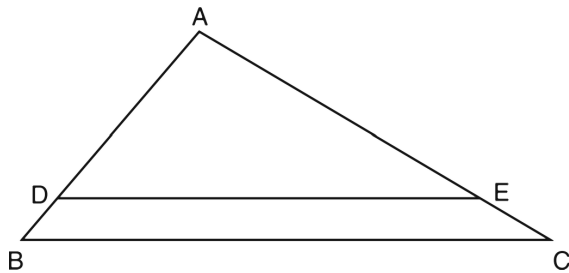
If $AB = 20$, $BC = 12$, and $AC = 16$, what is the perimeter of trapezoid $ABEF$?

- A. 24 B. 36 C. 40 D. 44
23. In the diagram below, $\triangle LMO$ is isosceles with $LO = MO$.



If $m\angle L = 55$ and $m\angle NOM = 28$, what is $m\angle N$?

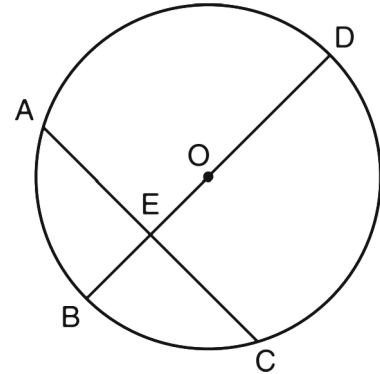
- A. 27 B. 28 C. 42 D. 70
24. In the diagram of $\triangle ABC$ shown below, $\overline{DE} \parallel \overline{BC}$



If $AB = 10$, $AD = 8$, and $AE = 12$, what is the length of \overline{EC} ?

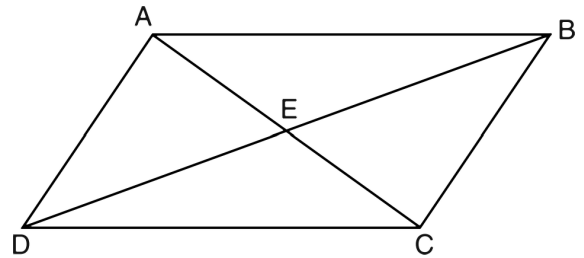
- A. 6 B. 2 C. 3 D. 15

25. In circle O shown below, diameter \overline{DB} is perpendicular to chord \overline{AC} at E .



If $DB = 34$, $AC = 30$, and $DE > BE$, what is the length of \overline{BE} ?

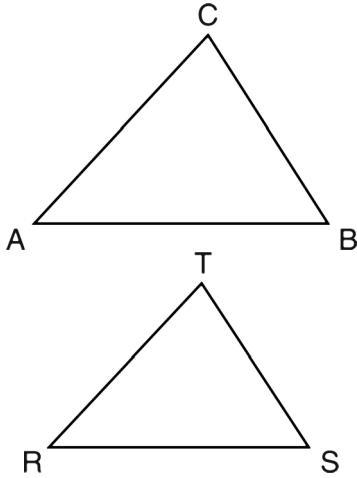
- A. 8 B. 9 C. 16 D. 25
26. In parallelogram $ABCD$ shown below, diagonals \overline{AC} and \overline{BD} intersect at E .



Which statement must be true?

- A. $\overline{AC} \cong \overline{DB}$ B. $\angle ABD \cong \angle CBD$
 C. $\triangle AED \cong \triangle CEB$ D. $\triangle DCE \cong \triangle BCE$

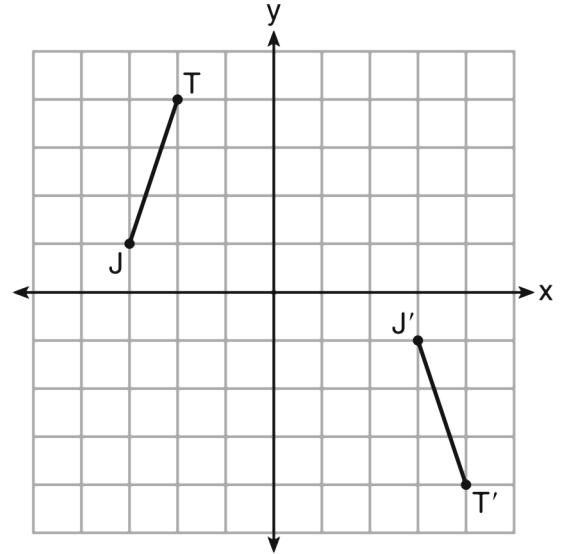
27. In the diagram below, $\triangle ABC \sim \triangle RST$.



Which statement is not true?

- A. $\angle A \cong \angle R$
 B. $\frac{AB}{RS} = \frac{BC}{ST}$
 C. $\frac{AB}{BC} = \frac{ST}{RS}$
 D. $\frac{AB + BC + AC}{RS + ST + RT} = \frac{AB}{RS}$

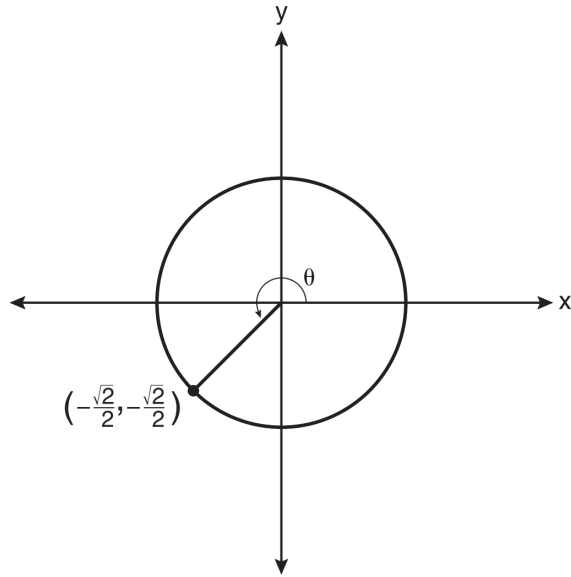
28. The graph below shows \overline{JT} and its image, $\overline{J'T'}$, after a transformation.



Which transformation would map \overline{JT} onto $\overline{J'T'}$?

- A. translation
 B. glide reflection
 C. rotation centered at the origin
 D. reflection through the origin
29. Which reason could be used to prove that a parallelogram is a rhombus?
- A. Diagonals are congruent.
 B. Opposite sides are parallel.
 C. Diagonals are perpendicular.
 D. Opposite angles are congruent.

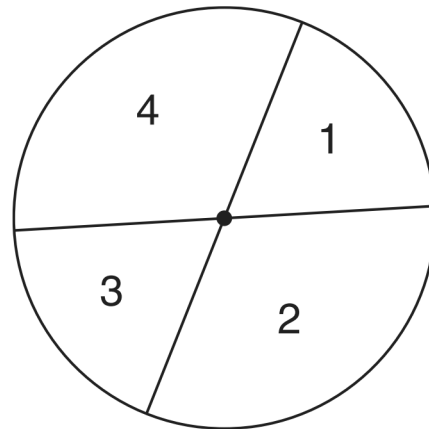
30. In the diagram below of a unit circle, the ordered pair $(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$ represents the point where the terminal side of θ intersects the unit circle.



What is $m\angle\theta$?

- A. 45 B. 135 C. 225 D. 240
31. What is the fifteenth term of the sequence 5, -10, 20, -40, 80, ...?
- A. -163,840 B. -81,920
C. 81,920 D. 327,680

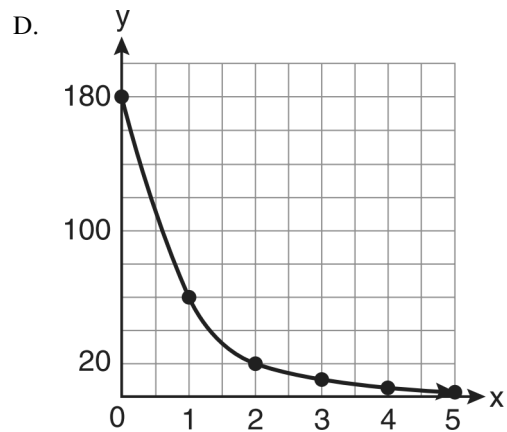
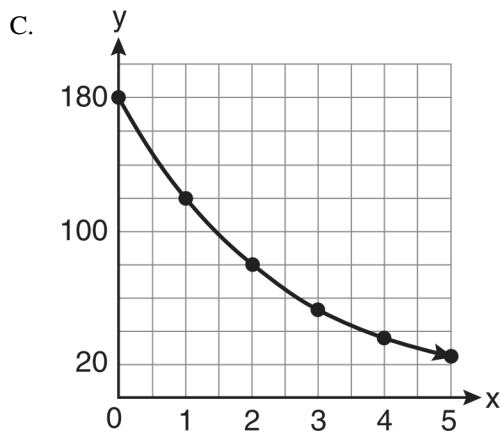
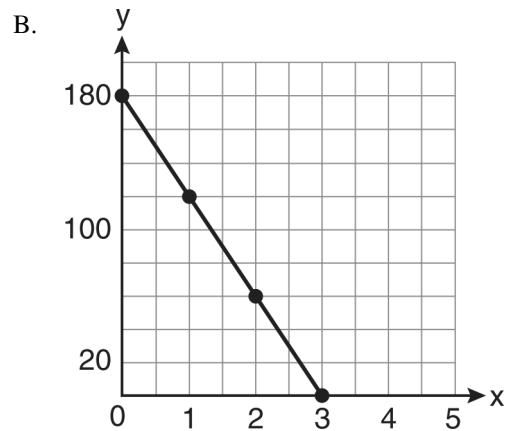
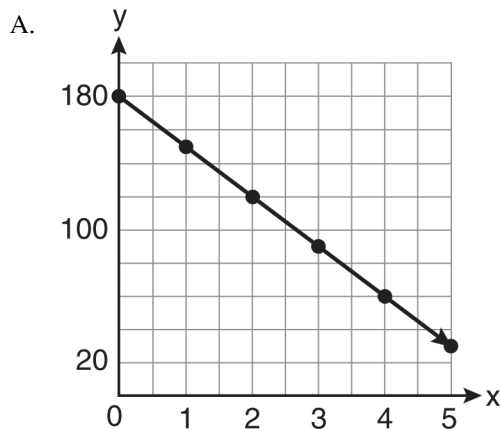
32. A dartboard is shown in the diagram below. The two lines intersect at the center of the circle, and the central angle in sector 2 measures $\frac{2\pi}{3}$.



If darts thrown at this board are equally likely to land anywhere on the board, what is the probability that a dart that hits the board will land in either sector 1 or sector 3?

- A. $\frac{1}{6}$ B. $\frac{1}{3}$ C. $\frac{1}{2}$ D. $\frac{2}{3}$
33. The conjugate of $7 - 5i$ is
- A. $-7 - 5i$ B. $-7 + 5i$
C. $7 - 5i$ D. $7 + 5i$
34. If $x^2 + 2 = 6x$ is solved by completing the square, an intermediate step would be
- A. $(x + 3)^2 = 7$ B. $(x - 3)^2 = 7$
C. $(x - 3)^2 = 11$ D. $(x - 6)^2 = 34$

35. On January 1, a share of a certain stock cost \$180. Each month thereafter, the cost of a share of this stock decreased by one-third. If x represents the time, in months, and y represents the cost of the stock, in dollars, which graph best represents the cost of a share over the following 5 months?



36. The yearbook staff has designed a survey to learn student opinions on how the yearbook could be improved for this year. If they want to distribute this survey to 100 students and obtain the most reliable data, they should survey

- A. every third student sent to the office.
 B. every third student to enter the library.
 C. every third student to enter the gym for the basketball game.
 D. every third student arriving at school in the morning.

37. A population of rabbits doubles every 60 days according to the formula $P = 10(2)^{\frac{t}{60}}$, where P is the population of rabbits on day t . What is the value of t when the population is 320?

- A. 240 B. 300 C. 660 D. 960

38. What is the solution set of the equation $3x^5 - 48x = 0$?

- A. $\{0, \pm 2\}$ B. $\{0, \pm 2, 3\}$
 C. $\{0, \pm 2, \pm 2i\}$ D. $\{\pm 2, \pm 2i\}$

39. A sequence has the following terms: $a_1 = 4, a_2 = 10, a_3 = 25, a_4 = 62.5$. Which formula represents the n th term in this sequence?

- A. $a_n = 4 + 2.5n$ B. $a_n = 4 + 2.5(n - 1)$
 C. $a_n = 4(2.5)^n$ D. $a_n = 4(2.5)^{n-1}$

40. What is the range of $f(x) = |x - 3| + 2$?

- A. $\{x|x \geq 3\}$
- B. $\{y|y \geq 2\}$
- C. $\{x|x \in \text{real numbers}\}$
- D. $\{y|y \in \text{real numbers}\}$

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1.
Answer: B
2.
Answer: A
3.
Answer: A
4.
Answer: D
5.
Answer: C
6.
Answer: D
7.
Answer: C
8.
Answer: C
9.
Answer: A
10.
Answer: A
11.
Answer: D
12.
Answer: D
13.
Answer: C
14.
Answer: C
15.
Answer: A
16.
Answer: B
17.
Answer: A
18.
Answer: B
19.
Answer: B

20.
Answer: A
21.
Answer: D
22.
Answer: B
23.
Answer: D
24.
Answer: D
25.
Answer: A
26.
Answer: D
27.
Answer: C
28.
Answer: D
29.
Answer: B
30.
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31.
Answer: C
32.
Answer: B
33.
Answer: D
34.
Answer: B
35.
Answer: C
36.
Answer: D
37.
Answer: B
38.
Answer: C
39.
Answer: D
40.
Answer: B